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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Appellant:	Manginell *et al.*	Group:	1743
Serial No.:	10/696,649	Paper No.:	
Filed:	10/28/2003	Examiner:	Nagpaul, Jyoti
For:	Non-Planar Chemical Preconcentrator		

APPEAL BRIEF

REAL PARTY IN INTEREST

The Real Party in Interest in the present Appeal is Sandia Corporation of Albuquerque, New Mexico, the assignee, as evidenced by the assignment set forth at Real 014136, Frame 0668.

RELATED APPEALS AND INTERFEREANCES

None.

STATUS OF CLAIMS

Claims 1-22 stand finally rejected by the Examiner as noted in final Office Action mailed April 4, 2006. The rejection of claims 1-22 is appealed. The claims presented for Appeal are set forth in the Claims Appendix, attached hereto.

STATUS OF AMENDMENTS

No amendments have been entered subsequent to final rejection.

SUMMARY OF CLAIMED SUBJECT MATTER

The present invention claims a non-planar chemical preconcentrator comprising a high-surface area, low mass, three-dimensional, flow-through sorption support structure that can be coated or packed with a sorptive material. The sorptive material can collect and concentrate a chemical analyte from a fluid stream and rapidly release it as a very narrow temporal plug for improved separations in a microanalytical system.

SUMMARY OF THE ART

Moyer et al., U.S. 5,194,154, discloses a cross-flow structure useful for filtering a fluid, for exchanging one or more constituents between two fluids, or for exchanging heat between two fluids. The structure includes a body having porous partition walls defining at least one open channel extending entirely through it. The body is composed of fused, interlocked, single crystal acicular ceramic material.

Manginell et al., U.S. 6,171,378, discloses a planar chemical preconcentrator wherein a sorptive material is coated on a suspended membrane. The sorptive coating can selectively sorb one or more chemical species of interest over a time period. The suspended membrane can be rapidly heated by a proximate heating element to rapidly release the sorbed chemical species for detection and analysis.

GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

Claims 1-22 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over *Moyer* in view of *Manginell*. The Examiner's rationale for the obviousness rejection, presented in the final office action, mailed April 4, 2006, is quoted below:

> "Moyer teaches a cross-flow structure useful for filtering a fluid. The structure comprises a substrate (18) having a suspended membrane (11) formed thereon. The structure further comprises a sorption support structure (12) disposed on a surface of the membrane (11). Moyer further teaches a sorptive material (26) disposed on the sorption support structure (12) to sorb and concentrate at least one chemical species from a fluid, the chemical species being releasable upon heating of the sorptive material. Moyer further teaches, "The surfaces of the porous partition walls 12 that define the open channels 14, as well as any surfaces of the end caps 18 exposed to the first fluid flowing through the open channels 14, are coated with a membrane 26 so as to line the channels 14. In the cross-flow filter 10 the membrane 26 is a porous discriminating layer 28, capable of allowing the exchange of one or more contaminants or constituents between the fluids being handled. The discriminating layer 28 is preferably a sintered alpha-alumina membrane, but can be any conventional layer suitable for filtration, microfiltration, ultrafiltration (for example, for sterilization, for purification of crystals, or the like), reverse osmosis (for example, for the desalination of sea water), or gas separation..."""
>
> "Moyer fails to explicitly teach a resistive heating element comprising of a metal and doped semiconductor material.
>
> Manginell teaches a chemical preconcentrator with application to chemical sensing and analysis. Manginell teaches the preconcentrator can be formed by depositing a resistive heating element (16) over a membrane and upon heating the sorptive material with the resistive heating element.
>
> It would have been obvious to one of the ordinary skill in the art to modify the system of Moyer such that at least one resistive heating element is disposed on the surface of the membrane as exactly taught by Manginell in order to achieve optimal filtration conditions of the filter."

Furthermore, in the Response to Arguments, the Examiner asserts:

> "Applicants argue that Moyer does not teach a sorptive material disposed on a sorptive support structure to sorb and concentrate a chemical species of interest from a sample fluid. Moyer does in fact teach this limitation as recited in Claim 1. Please refer in the above rejection."

ARGUMENT

CLAIMS 1-22, LIMITED TO A SORPTIVE MATERIAL DISPOSED ON A SORPTION SUPPORT STRUCTURE, ARE NOT MADE OBVIOUS BY *MOYER* IN VIEW OF *MANGINELL*

The Office rejected Claims 1-22, asserting that the Appellants' non-planar chemical preconcentrator is made obvious by *Moyer's* cross-flow structure useful for filtering a fluid, in view of *Manginell's* planar chemical preconcentrator. To establish a *prima facie* case of obviousness, the prior art references must teach or suggest all the claim limitations, there must be some suggestion or motivation to modify or combine the reference teachings, and there must be some reasonable expectation of success. *See* MPEP 2143.

All claim limitations must be taught or suggested by the prior art. *See* MPEP 2143.03. *Moyer* teaches a FILTER comprising a membrane 26 and a porous discriminating layer 28 capable of exchanging constituents between counter-flowing fluid streams. *See Moyer*, col. 6, lines 34-42; col. 8, lines 47-61; and FIG. 5. The membrane/layer 26, 28 separates constituents between fluid streams 40, depending on the relative size of the constituents. *See Moyer*, col. 9, lines 12-23; col. 9, lines 38-5; and FIG. 5. *Webster* (Ninth New Collegiate Dictionary, 1984) defines a filter as "a porous article or mass (as of paper or sand) through which a gas or liquid is passed to separate out matter in a suspension." There is no teaching or suggesting in either *Moyer* or the accepted meaning that *Moyer's* filter sorbs a chemical species, as asserted by the Examiner. Further, *Manginell* teaches a sorptive material 18 formed on a planar suspended membrane 14. *See Manginell*, col. 4, lines 34-49, and FIG. 1b. Neither *Moyer* nor *Manginell* teach or suggest a sorptive material disposed on a sorptive support structure to sorb and concentrate a chemical species of interest from a fluid sample, as recited in Appellants' claim 1. *See* Application, page 6, lines 1-8, and claim 1.

Further, obviousness can only be established by combining or modifying teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either explicitly or implicitly in the references themselves or in the knowledge generally available to one of ordinary skill in the art. *See* MPEP 2143.01. The burden is on the Examiner to explain why the combination of the teachings is proper. The Examiner provides no objective evidence or specific factual findings in the references as to why a person would be specifically motivated to combine *Moyer* and *Manginell* to achieve Appellants' non-planar preconcentrator.

The Examiner merely states that "it should have been obvious to one of ordinary skill in the art to modify the system of *Moyer* such that at least one resistive heating element is disposed on the surface of the membrane as exactly taught by *Manginell* in order to achieve optimal filtration conditions of the filter." As argued above, *Moyer's* filter performs a different function from the sorptive material of Appellants' chemical preconcentrator. Further, there is no objective evidence or specific factual findings in either *Moyer* or *Manginell* that temperature, as provided by *Manginell's* resistive heating element, has any affect whatsoever on *Moyer's* filtration conditions.

Further, there must be some reasonable expectation of success. *See* MPEP 2143.02. *Moyer's* cross-flow structure is clearly a large, macroscale device. There is no teaching or suggestion that *Moyer's* body 11 is a thin-film membrane, made from semiconductor materials, that has high thermal efficiency and low heat capacity, as required for Appellants' rapid thermal desorption of a sorbed chemical analyte. *See* Application, page 3, lines 8-21, and claim 1. Further, there is no teaching or suggestion in *Moyer* or *Manginell* that *Manginell's* thin-film resistive heating element could provide rapid heating of *Moyer's* body 11, as required by Appellants' non-planar preconcentrator. *See* Application, page 14, lines 1-14. Therefore, there is no reasonable expectation that combining *Moyer's* large body with *Manginell's* thin-film resistive heating element would provide rapid heating of *Moyer's* body or rapid thermal desorption of any sorbed chemical analyte.

Finally, *Moyer* is nonanalogous art and cannot be relied on for an obviousness rejection. *Moyer* teaches a cross-flow structure that can be used for filtering, or exchanging constituents or heat between fluid streams. Therefore, *Moyer* is neither in the field of Appellants' endeavor (chemical analysis) nor reasonably pertinent to the particular problem with which the inventor is concerned (chemical preconcentration). Nor is their any reference in *Moyer* to either chemical analysis or chemical preconcentration. *See* MPEP 2141.01(a).

Appellants submit that the Examiner has not established a *prima facie* case of obviousness. Accordingly, Appellants submit that this rejection is overcome and that Claim 1 is in condition for allowance. Furthermore, Appellants submit that Claims 2-22, which depend from and further define Claim 1, are likewise in condition for allowance. *See* MPEP 2143.03.

FEE FOR FILING APPEAL BRIEF

Pursuant to 37 CFR 41.20(b)(2), the fee for filing the Appeal Brief is $500. Authorization is hereby made to charge the appeal brief fee and any additional fees which may be required to Deposit Account 19-0131.

SUMMARY

Appellants submit that their non-planar chemical preconcentrator, comprising a substrate having a suspended membrane formed thereon, at least one resistive heating element disposed on a surface of the suspended membrane, a sorption support structure disposed on a surface of the membrane, and a sorptive material disposed on the sorption support structure to sorb and concentrate at least one chemical species from a sample fluid, with the chemical species being releasable from the sorptive material upon heating of the sorptive material by the at least one resistive heating element is not made obvious by *Moyer* in view of *Manginell*. Accordingly, Appellants submit that the rejection of Claims 1-22 was erroneous, and respectfully request reversal.

Respectfully submitted,

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CERTIFICATION UNDER 37 CFR 1.8

I hereby certify that this correspondence and documents referred to herein were deposited with the United States Postal Service as first class mail addressed to: Commissioner for Patents, Alexandria, VA 22313 on the date shown below.

DATE: 5-9-06 BY: Mary Lou Bota

CLAIMS APPENDIX

The following claims are presented for Appeal:

1. A non-planar chemical preconcentrator, comprising:

a substrate having a suspended membrane formed thereon,

at least one resistive heating element disposed on a surface of the suspended membrane,

a sorption support structure disposed on a surface of the membrane,

a sorptive material disposed on the sorption support structure to sorb and concentrate at least one chemical species from a sample fluid, with the chemical species being releasable from the sorptive material upon heating of the sorptive material by the at least one resistive heating element.

2. The non-planar chemical preconcentrator of claim 1, wherein the sorption support structure comprises a material selected from the group consisting of dielectrics and semiconductors.

3. The non-planar chemical preconcentrator of claim 2, wherein the sorption support structure comprises silicon.

4. The non-planar chemical preconcentrator of claim 1, wherein the sorption support structure comprises a material selected from the group consisting of silicon, polycrystalline silicon, silicon nitride, silicon oxynitride, and silicon carbide.

5. The non-planar chemical preconcentrator of claim 1, wherein the sorption support structure comprises a plurality of concentric hollow cylinders.

6. The non-planar chemical preconcentrator of claim 1, wherein the sorption support structure comprises a plurality of fins.

7. The non-planar chemical preconcentrator of claim 1, wherein the sorption support structure comprises a plurality of posts.

8. The non-planar chemical preconcentrator of claim 1, wherein the sorption support structure comprises a honeycomb structure.

9. The non-planar chemical preconcentrator of claim 1, wherein the suspended membrane is selected from the group consisting of semiconductors and dielectrics.

10. The non-planar chemical preconcentrator of claim 9, wherein the suspended membrane comprises silicon nitride.

11. The non-planar chemical preconcentrator of claim 1, wherein the suspended membrane comprises a material selected from the group consisting of silicon, polycrystalline silicon, silicon nitride, silicon oxide, silicon oxynitride, and silicon carbide.

12. The non-planar chemical preconcentrator of claim 1, wherein the suspended membrane comprises a polymer layer.

13. The non-planar chemical preconcentrator of claim 1, wherein the at least one resistive heating element comprises a metal or metal alloy.

14. The non-planar chemical preconcentrator of claim 1, wherein the at least one resistive heating element comprises doped semiconductor material.

15. The non-planar chemical preconcentrator of claim 1, wherein the at least one resistive heating element comprises a circuitous conducting trace.

16. The non-planar chemical preconcentrator of claim 1, wherein the sorptive material comprises a microporous material.

17. The non-planar chemical preconcentrator of claim 16, wherein the sorptive material comprises porous silicon.

18. The chemical preconcentrator of claim 1, wherein the sorptive material comprises a sol-gel oxide.

19. The non-planar chemical preconcentrator of claim 1, wherein the sorptive material comprises a polymer.

20. The non-planar chemical preconcentrator of claim 1, wherein the sorptive material comprises a particulate material.

21. The non-planar chemical preconcentrator of claim 20, further comprising at least one packing stop to retain the particulate material.

22. The non-planar chemical preconcentrator of claim 1, further comprising at least one hole formed in the suspended membrane for flow of the sample fluid therethrough.

EVIDENCE APPENDIX

none.

RELATED PROCEEDINGS APPENDIX

None.